

217/782-2113

CONSTRUCTION PERMIT - NSPS

PERMITTEE

City of Waterloo
Attn: Perry Schlemmer
100 West Fourth Street
Waterloo, Illinois 62298

Application No: 01040072 I.D. No.: 133030AAO
Applicants Designation: GT#1, GT#2 Date Received: April 27, 2001
Subject: Two Dual Fuel-Fired Turbines (Power Generation)
Date Issued: November 21, 2001
Location: Waterloo City Light Plant, Third and Lemen Streets, Waterloo,
Monroe County

Permit is hereby granted to the above-designated Permittee to CONSTRUCT emission source(s) and/or air pollution control equipment consisting of two dual fuel fired turbines (Units GT#1 and GT#2, with rated capacity of 7 Mwe and 5 Mwe, respectively), and other ancillary operations, as described in the above referenced application and summarized in Attachment A. This Permit is subject to standard conditions attached hereto and the following special condition(s):

- 1a. The turbines are subject to the New Source Performance Standard (NSPS) for Stationary Gas Turbines, 40 CFR 60, Subpart A and GG. The Illinois EPA is administrating NSPS in Illinois on behalf of the United States EPA under a delegation agreement.
- b. The Permittee shall not emit into the atmosphere from any turbine any gases which contain nitrogen oxides (NO_x) in excess of the following equation, when it is being fired on natural gas pursuant to 40 CFR 60.332 (a) (2) and (k):

$$STD = 0.015 \left(\frac{14.4}{Y} \right) + F$$

Where:

STD = Allowable NO_x emission (percent by volume at 15 percent oxygen and on a dry basis).

Y = Manufacturer's rated heat rate at manufacture's rated load (kilojoules per watt hour) or, actual measured heat rate based on lower heating value of fuel as measured and actual peak load for the facility. The value of Y shall not exceed 14.4 kilojoules per watt-hour.

F = NO_x emission allowance for fuel-bound nitrogen as defined in 40 CFR 60.332 (a) (3).

- c. The Permittee shall either not emit into the atmosphere from any turbine any gases that contain sulfur dioxide in excess of 0.015 percent by volume at 15 percent oxygen and on a dry basis or shall not burn any fuel that contains sulfur in excess of 0.8 percent by weight, pursuant to 40 CFR 60.333 (a) and (b).
 - d. At all times, the Permittee shall maintain and operate the turbines in a manner consistent with good air pollution control practice for minimizing emissions, pursuant to the NSPS, 40 CFR 60.11(d).
2. The emission of smoke or other particulate matter from each turbine shall not have an opacity greater than 30 percent, pursuant to 35 IAC 212.123(a), except as allowed below (35 IAC 201.149, 212.123(b) or 212.124).
- a. The Permittee is authorized to operate the turbines in excess of 30 percent opacity during startup pursuant to 35 IAC 201.262, provided that all reasonable efforts are made to minimize startup emissions. This authorization only extends for a period of up to 30 minutes following the initial firing of fuel during each startup event or the end of startup, whichever occurs first.
- 3a. The turbines are not qualifying as Electrical Generating Units (EGU) for purposes of Part 217, Subpart W, the NO_x Trading Program for Electrical Generating Units, because the capacity of each turbine is less than 25 Mw.
- b. Fuels with a sulfur content greater than 0.05 weight percent on an annual basis, as determined below, shall not be fired in each turbine, pursuant to the Permittee's representation that the units are exempt from the Acid Rain Program by meeting the new units exemption requirement of 40 CFR 72.7(a). The turbines are subject to the Acid Rain Program provisions of 40 CFR 72.2 through 72.7 and 72.10 through 72.13.
 - c. The Permittee shall use the following equation to address compliance with the above sulfur limit pursuant to 40 CFR 72.7(d) (3):

$$\% S_{\text{annual}} = \frac{\sum_{n=1}^{\text{last}} \% S_n M_n d_n}{\sum_{n=1}^{\text{last}} M_n d_n}$$

Where:

$\% S_{\text{annual}}$ = Annual average sulfur content of the fuel burned during the year by the unit, as a percentage by weight;

$\% S_n$ = Sulfur content of the nth sample of the fuel delivered during the year to the unit, as a percentage by weight;

- M_n = Mass of the nongaseous fuel in a delivery during the year to the unit of which the nth sample is taken, in lb; or for fuel delivered during the year to the unit continuously by pipeline, mass of the nongaseous fuel delivered starting from when the nth sample of such fuel is taken until the next sample of such fuel is taken, in lb;
- d_n = Density of the nth sample of the fuel delivered during the year to the unit, in lb per gallon; and
- n = Each sample taken of the fuel delivered during the year to the unit, taken at least once for each delivery; or, for fuel that is delivered during the year to the unit continuously by pipeline, at least once each quarter during which the fuel is delivered.
- d. The Illinois EPA shall be allowed to sample all fuels stored at the source.
- 4a. i. A. The only fuels fired in the turbines shall be natural gas and distillate fuel oil.
- B. Distillate fuel oil shall only be used as an emergency fuel, i.e., in circumstances such as natural gas curtailment or breakdown of the delivery system that makes it impossible to fire natural gas.
- ii. The total fuel consumption of the turbines shall not exceed 768 million standard cubic feet per year. For purposes of determining compliance with this limit, 1000 gallon of fuel oil shall be considered equivalent to 537,000 scf of gas. Compliance with this limit shall be determined from a running total of 12 months of data. Following completion of emission testing in accordance with Condition 11, the Illinois EPA may at the request of the Permittee based on the results of emissions testing, revise the limitation on fuel usage in conjunction with appropriate revisions to the applicable short-term emission limits for the turbines.
- b. The turbines shall be equipped, operated, and maintained with Dry low NO_x combustors to control NO_x emissions.
- c. i. Hourly emissions from each turbine shall not exceed the following limits, except during startup and shutdown (see Condition 5). These emission limits are based on the data provided in the application for maximum emissions. These limits are based on information provided in the permit application.

<u>Turbine/Fuel</u>	<u>NO_x</u> <u>(Lb/Hr)</u>	<u>CO</u> <u>(Lb/Hr)</u>	<u>PM/PM₁₀</u> <u>(Lb/Hr)</u>	<u>VOM</u> <u>(Lb/Hr)</u>	<u>SO₂</u> <u>(Lb/Hr)</u>
GT #1/Gas	7.42	9.04	0.45	2.55	0.25
GT #2/Gas	5.95	7.25	0.36	2.07	0.20
GT #1/Oil	27.28	8.65	0.83	2.48	2.29
GT #2/Oil	12.04	7.33	0.71	2.10	1.94

- d. i. The total annual emissions from the turbines (GT#1 and GT#2) shall not exceed the following limitations. Compliance with these annual limitations shall be determined from a running total of 12 months of emission data.

<u>Pollutant</u>	<u>Emissions</u> <u>(Tons/Year)</u>
NO _x	39.00
CO	47.55
PM/PM ₁₀	2.35
VOM	13.41
SO ₂	1.33

- ii. For purposes of determining compliance with the above limitations:

- A. Emissions from a turbine shall be determined from emission factors developed from testing in accordance with Condition 10 (NO_x), standard emission factors (CO, VOM and PM/PM₁₀) and analysis of fuel sulfur content or standard factors (SO₂).
- B. In addition, unless an alternative factor is established for NO_x, emissions of NO_x from a turbine for an hour that includes a startup shall be presumed to be at the applicable hourly limit in Condition 4(c) (i) multiplied by a startup factor of 1.25. The NO_x emissions for GT# 1 each hour that includes a startup, beginning with the startup, shall be assumed to be at the rate of 9.28 pounds (1.25 x 7.42 = 9.28).
- C. The establishment of the above procedures for determining compliance with the annual emission limits shall not shield the Permittee from responsibility for all emissions from the source, including emissions during startup or upset conditions, as other credible information may demonstrate that the above procedures do not adequately account for the actual emissions of the source.

- e. Annual emissions of hazardous air pollutants shall be less than 10 tons of any hazardous pollutant and less than 25 tons in aggregate for any combination of hazardous air pollutants, as indirectly addressed by limits on emissions of criteria pollutants.

The above limitations are established to address applicability for 40 CFR 52.21, the federal rules for Prevention of Significant Deterioration of Air Quality (PSD) and 35 IAC Part 203 Major Stationary Sources Construction and Modification (MSSCAM). These limits ensure that the construction and operation of the turbines does not constitute a major modification pursuant to these rules. These limits also ensure that this project is not subject to review under Section 112(g) of the Clean Air Act.

- 5a. Each turbine shall be operated in a manner consistent with good air pollution control practice to minimize emissions during startup and shutdown including the following:
- i. The Permittee shall operate the turbines in accordance with written operating procedures that shall include at a minimum the following measures:
 - A. Review of operating parameters of the unit during startup or shutdown as necessary for proper turbine operation with appropriate adjustments to reduce emissions; and
 - B. Implementation of inspection and repair procedures for a turbine prior to attempting startup following repeated trips.
 - ii. The Permittee shall maintain the turbines in accordance with written procedures that shall include at a minimum the following measures:
 - A. Periodic inspection of emissions-related components;
 - B. Timely repair and routine replacement of emissions-related components.
 - b. The above procedures may incorporate the manufacturer's written instruction for operation and maintenance of the turbines and associated control systems. The Permittee shall review these procedures at least every two years and shall revise or enhance them if necessary to be consistent with good air pollution control practice based on the actual operating experience and performance of the source.
- 6a. Under this permit, the turbines may be operated for a period of up to 180 days from initial startup to allow for equipment shakedown and emissions testing as required. This period may be extended by the Illinois EPA at its discretion upon request of the Permittee, for example if additional time is needed to complete shakedown or perform emission testing due to unanticipated delays in these activities.
- b. Upon successful completion of emission testing demonstrating compliance with applicable short-term emission limits, the Permittee may continue to operate the turbines as allowed by Section 39.5 (5) of the Environmental Protection Act.

- c. This condition supersedes Standard Condition 6 for construction permits.
- 7. The Permittee shall furnish the Illinois EPA with written notification as follows:
 - a. The date construction of the turbines commenced, as defined in 40 CRR 60.2, postmarked no later than 30 days after such date, pursuant to 40 CFR 60.7(a)(1).
 - b. The actual date of initial startup of each turbine, i.e., initial firing of fuel by turbine, postmarked within 15 days after such date, pursuant to 40 CFR 60.7(a)(3).
- 8. Each turbine shall be equipped, operated, and maintained with a meter for fuel consumption. Note: As the turbines do not use water injection for control of NO_x, this meter does not have to be equipped with a recording device but can be read manually.
- 9a. The Permittee shall sample and analyze for sulfur and nitrogen content of the natural gas being fired in the turbines in accordance with 40 CFR 60.334(b) unless alternative provisions are approved by USEPA, in which case the Permittee shall comply with such alternative provisions.
- 10a. The nitrogen oxides (NO_x) emissions, and the oxygen (O₂) concentration and opacity of exhaust shall be measured for the turbines at the Permittee's expense by an independent testing service approved by the Illinois EPA as follows to determine compliance with applicable emission limits.
 - i. Within 60 days after operating a turbine at the greatest load at which it will normally be operated but not later than 180 days after its initial startup;
 - ii. If a spare turbine is installed that has not previously been tested (refer to Condition 16), within 60 days after operating the spare turbine at the greatest load at which it will normally be operated but not later than 180 days after its initial startup;
 - iii. Within 120 days after a written request from the Illinois EPA, for such pollutants listed above as specified by the request; and
 - iv. Any extension to these time periods that may be provided at its discretion by the Illinois EPA shall not alter the Permittee's obligation to perform emission testing for purposes of the NSPS in a timely manner as specified by 40 CFR 60.8.
- b. The following methods and procedures shall be used for testing of emissions:

- i. The USEPA Reference Test Methods shall be used including the following:

Opacity	USEPA Method 9
Nitrogen Oxides	USEPA Method 20
- ii. Measurements for NO_x shall be conducted in accordance with 40 CFR 60.335, as specified below, unless alternative testing procedures are approved by USEPA pursuant to 40 CFR 60.8(b):
 - A. The NO_x emissions shall be computed for each run using the equation in 40 CFR 60.335(c) (1).
 - B. The span values for Method 20 shall be 300 ppm of NO_x and 21 percent O₂, pursuant to 40 CFR 60.335(c) (3).
 - C. The NO_x emissions shall be determined at four points in the normal operating range of the turbines, including the minimum point in the range and peak load, pursuant to 40 CFR 60.331(i) and 60.335(c) (2).
 - D. All loads shall be corrected to ISO conditions using the appropriate equations supplied by the manufacturer, pursuant to 40 CFR 60.335(c) (2).
- c. At least 60 days prior to the actual date of testing, a written test plan shall be submitted to the Illinois EPA for review. This plan shall describe the specific procedures for testing and shall include as a minimum:
 - i. The person(s) who will be performing sampling and analysis and their experience with similar tests.
 - ii. The specific conditions under which testing shall be performed including a discussion of why these conditions will be representative of maximum emissions and the means by which the operating parameters for the turbine will be tracked and recorded.
 - iii. The specific determinations of emissions that are intended to be made, including sampling and monitoring locations; the test method(s) that will be used, with the specific analysis method, if the method can be used with different analysis methods. The Permittee may also propose a plan for testing across the normal operating range of the turbines.
- d. The Illinois EPA shall be notified prior to these tests to enable the Illinois EPA to observe these tests. Notification of the expected date of testing shall be submitted a minimum of thirty (30) days prior to the expected date. Notification of the actual date and expected time of testing shall be submitted a minimum of five (5) working days prior to the actual date of the test. The Illinois EPA may, at its discretion, accept notifications with shorter advance notice provided

that the Illinois EPA will not accept such notifications if it interferes with the Illinois EPA's ability to observe the testing.

- e. The Final Report for these tests shall be submitted to the Illinois EPA within 60 days after the date of the tests. The Final Report shall include as a minimum:

- i. A summary of results.
- ii. General information.
- iii. Description of test method(s), including description of sampling points, sampling train, analysis equipment and test schedule.
- iv. Detailed description of test conditions, including:
 - A. Fuel consumption (standard ft³);
 - B. Firing rate (million Btu/hr); and
 - C. Turbine/Generator output rate (MW).
- v. Data and calculations, including copies of all raw data sheets and records of laboratory analyses, sample calculations, and data on equipment calibration.

- 11a. The Permittee shall maintain records of the following items:

- i. Heat content of the natural gas (Btu/ft³) being fired during the quarter, with supporting documentation on at least a quarterly basis;
- ii. The sulfur content of the natural gas used to fire the turbines as determined in accordance with Condition 9(a). (If the standard emissions factor is used, records shall be kept for any measurements or data on actual sulfur content of natural gas.);
- iii. Fuel consumption for each turbine as monitored in accordance with Condition 8;
- iv. A copy of the Final Report(s) for emission testing conducted pursuant to Condition 10;
- v. Copies of opacity determinations taken for the source by qualified observer(s) using USEPA Method 9; and
- vi. Records documenting its periodic review of its operating procedures (See Condition 5).

- b. The Permittee shall maintain the following records for the source:

- i. Records for each shipment of fuel oil received, the amount received, sulfur content, and supplier;
 - ii. Records of the sulfur content of the fuel oil supply to the turbine, with supporting calculations using the equation in Condition 3(b); and
 - iii. Records of operation of a turbine with an oil in excess of 0.05 percent by weight sulfur, with date, duration, sulfur content of oil, and explanation.
- c. The Permittee shall maintain the following operating records for the turbines:
- i. Operating logs for each turbine, which at a minimum shall include daily information for operating hours; and fuel consumption; and
 - ii. Operating hours for each turbine on a monthly basis;
- d. The Permittee shall maintain the following records related to each startup and shutdown of the turbines:
- i. The following information for each startup of the turbines:
 - A. Date and time of startup;
 - B. Whether operating personnel for the turbines or air environmental staff are on site during startup; and
 - C. A description of the startup, if written operating procedures are not followed during the startup or significant problems occur during the startup, including detailed explanation.
 - ii. The following information for each shutdown of a turbine:
 - A. Date and time of shutdown; and
 - B. A description of the shutdown, if written operating procedures are not followed during the shutdown or significant problems occur during the shutdown, including detailed explanation.
 - iii. The following information for the turbines when above normal opacity has been observed by source personnel:
 - A. Name of observer, position and reason for being at site;
 - B. Date and duration of above normal opacity, including affected turbine, start time and time normal operation was achieved;

- C. If normal operation was not achieved within 30 minutes, an explanation why startup could not be achieved within this time;
 - D. A detailed description of the startup, including reason for operation;
 - E. An explanation why established startup procedures could not be performed, if not performed;
 - F. The nature of opacity following the end of startup or 30 minutes of operation, whichever occurs first, and duration of operation until achievement of normal opacity or shutdown; and
 - G. Whether exceedance of Condition 2(a) [30 percent opacity] may have occurred during startup, with explanation if qualified observer was on site.
- e. The Permittee shall keep inspection, maintenance and repair logs with dates and nature of such activities for each turbine.
 - f. The Permittee shall maintain the following records related to emissions of the turbines:
 - i. Other data not addressed above, used or relied upon by the Permittee to determine emissions;
 - ii. Fuel consumption and number of startups for each turbine;
 - iii. The emissions of NO_x, SO₂, PM, VOM and CO from the turbines for each month since the previous record with supporting calculation, which shall be compiled on at least a semi-annual basis;
 - iv. Total, monthly and annual emissions of NO_x, CO, VOM, PM and SO₂ from the turbines, which shall be compiled on at least a semi-annual basis.
 - g. The Permittee shall maintain records that identify any day in which emission exceeded an applicable standard or limit.
12. All records and logs required by this permit shall be retained at a readily accessible location at the source for at least three years from the date of entry and shall be available for inspection and copying by the Illinois EPA upon request. Any record retained in an electronic format (e.g., computer) shall be capable of being retrieved and printed on paper during normal source office hours so as to be able to respond to an Illinois EPA request for records during the course of a source inspection.
- 13a. In conjunction with the Annual Emission Report required by 35 IAC Part 254, the Permittee shall provide:

The operating hours for each turbine, the total number of startups, and the total fuel consumption during the preceding calendar year;

- b. The Permittee shall notify the Illinois EPA if oil with a sulfur content greater than 0.05 percent by weight is fired in a turbine.
 - c. If there is any exceedance of the requirements of Conditions 1, 2 or 4 of this permit, as determined by the records required by this permit or by other means, the Permittee shall submit a report within 30 days after the exceedance. The report shall include the emissions released in accordance with the recordkeeping requirements, a copy of the relevant records, and a description of the exceedance or violation and efforts to reduce emissions and future occurrences.
14. Two copies of required reports and notifications concerning equipment operation or repairs, performance testing, or a continuous monitoring system shall be sent to:

Illinois Environmental Protection Agency
Division of Air Pollution Control
Compliance Section (#40)
P.O. Box 19276
Springfield, Illinois 62794-9276

Telephone: 217/782-5811 Facsimile: 217/782-6348

and one copy shall be sent to the Illinois EPA's regional office at the following address, unless otherwise indicated:

Illinois Environmental Protection Agency
Division of Air Pollution Control
2009 Mall Street
Collinsville, Illinois 62234

Telephone: 618/346-5120 Facsimile: 618/346-5155

15. The Permittee is allowed to operate the new turbines under this construction permit for a period of two years from the initial startup of turbines or until a revised CAAPP permit is issued for the source, whichever occurs first.
16. Pursuant to this permit, the Permittee is also authorized to construct and operate a "substitute turbine" in the place of turbine GT #1 or GT #2 when it is out of service, subject to the following:
- a. For this purpose, a substitute turbine means a model of turbine that is identical or similar to turbine GT #1 or GT #2, as appropriate, that is provided by the turbine supplier as part of its original contractual agreement with the Permittee;

- b. The Permittee shall notify the Illinois EPA within 30 days of installing a substitute turbine. This notification shall describe the circumstances of the turbine that is out of service and the nature of the maintenance or repairs that are to be performed, and provide the date that the substitute turbine is expected to be or was installed and the date that the original turbine is expected to be returned to service. This notification shall also include a copy of the emission test report for the substitute turbine, if emission testing has previously been performed on the substitute turbine;
 - c. The authorization to operate a substitute turbine extends for a period of up to six months for each incident in which a turbine is out of service, beginning with the date that the substitute turbine first operates at the source. The Permittee must obtain a separate Construction Permit to continue to operate beyond this period, which permit may impose additional requirements upon the substitute turbine as appropriate for such continued operation;
 - d. If the original turbine undergoes reconstruction or modification while it is out of service, a separate construction permit may be required prior to reinstalling the original turbine, which permit may impose additional requirements upon the turbine as are then appropriate.
- 17a. This Permit for the above referenced project does not relieve the Permittee of the responsibility to comply with all Local, State and Federal Regulations which are part of the applicable Illinois State Implementation Plan, as well as all other applicable Federal, State, and Local requirements.
- b. In particular, this Permit does not relieve the Permittee from the responsibility to carry out practices during the construction and operation of the plant, such as application of water or dust suppressant sprays to unpaved traffic areas, to minimize fugitive dust and prevent an air pollution nuisance from fugitive dust, as prohibited by 35 IAC 201.141.

If you have any questions concerning this permit, please contact Youra Benofamil at 217/782-2113.

Donald E. Sutton, P.E.
Manager, Permit Section
Division of Air Pollution Control

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cc: Region 3

I.D. No.: 133030AAO
Application No.: 01040072
City of Waterloo

Attachment A

Description of Emission Units

<u>Unit</u>	<u>Manufacturer</u>	<u>Rated Heat Input¹ (mmBtu/hr)</u>	<u>Rated Electrical Output¹ (MW_e)</u>	<u>Control</u>
GT #1 Turbine	Taurus 70S-10301 ²	74.49	7.0	Dry Low NO _x Combustors
GT #2 Turbine	Taurus 60S-7801 ²	59.70	5.0	Dry Low NO _x Combustors

¹ Ratings are the nominal output based on higher heating value of natural gas and operation at 59°F.

² An equivalent model may be substituted for the turbines with written approval from the Illinois EPA. For this purpose, the supplier of an equivalent turbine must provide similar or lower guaranteed emission rates, in lb/mmBtu or ppm, than the Taurus 70S-10301 and Taurus 60S-7801.

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